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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE.



SEPTEMBER 17, 1932

Great Wall of America

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Edited by WATSON DAVIS

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DO YOU KNOW THAT

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The ancient Romans regarded silk as a sort of wool that grew on trees.

Dry ice, solid carbon dioxide, has a temperature of about 114.5 degrees Fahrenheit below zero.

A survival of old sun worship is noted in Armenia, where oaths are still administered in the name of the sun.

The Laurentides Park, in the Province of Quebec, has more than 1,500 lakes and rivers in its territory.

Italy's four leading crops—wheat, wine, olive oil, and hemp—fell off one-third last year, as compared with the year 1929-30.

In the law code of Hammurabi, ruler of ancient Babylon, was a provision requiring a builder to make good any destruction of property caused by collapse of one of his buildings.

The Missouri Botanical Garden tells of an albino California redwood tree, which was grown there in a bowl from a piece of bark and which developed white shoots and leaves and no roots.

State forestry departments distributed more than 100,000,000 trees for forest planting last year.

Of the 14,000,000 foreign born inhabitants of the United States, 8.7 per cent. cannot speak English.

Waterspouts sometimes observed on the sea have an average height of 1,000 feet, but an occasional one shoots more than a mile high.

Plantain, one of the most troublesome lawn weeds, may be "painted" out of a lawn by daubing the leaves at the plant center with gasoline.

U. S. Public Health Service figures indicate that there are over two million cases of malaria annually in the southeastern United States.

A dozen eggs weighing 26 ounces contain almost one-third more food than a dozen eggs weighing 20 ounces.

Yellowstone National Park has discovered that it possesses a "cold geyser" which spouts some three feet in the air because of the presence of carbon dioxide gas.

WITH THE SCIENCES THIS WEEK

Curiosity arousing questions for the teacher and general reader. Book references in italic type are not sources of information of the articles, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

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Why should a great shower of Leonid meteors be expected in November? p. 181. *Meteors—Charles P. Olivier—Williams & Wilkins, 1925, \$6.*

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ASTRONOMY-PHYSICS

What does "shrinking atom" mean? p. 176.

BOTANY

How old is plant sociology? p. 180. *Plant Sociology—J. Braun-Blanquet (transl. by G. D. Fuller and H. S. Conrad)—McGraw-Hill (in press).*

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Does alcohol make the blood acid or alkaline? p. 181.

PSYCHOLOGY

Do babies like color in pictures? p. 180.

How is the mentality of humans distinguished from that of apes? p. 175. *The Great Apes—Robert M. Yerkes and Ada W. Yerkes. Yale Univ. Press, 1929, \$10.*

How much mental deficiency is caused by birth injury? p. 175.

Is a neurotic husband likely to accuse his wife of being neurotic? p. 180.

TYPOGRAPHY

When were the oldest printing blocks made? p. 175. *The Invention of Printing in China—Thomas Francis Carter, Columbia Univ. Press, 1925, \$5.*

PSYCHOLOGY

Chimpanzee Excels Baby In Several Mental Tests

Ape Learned Faster and Remembered Longer Than Human Infant With Whom She Lived

AN APE brought up with a child in a human family is superior to her human "brother" in performance on a number of mental tests and experiments, the psychologist who performed the experiment, Dr. W. N. Kellogg, declared before the meeting of the American Psychological Association in Ithaca.

Motion pictures were shown by Dr. Kellogg, professor at Indiana University, of an infant chimpanzee and human baby learning to untie knots and performing other tests of their mental development. The two had been brought up together for nine months. The ape learned more rapidly, remembered longer, and for the first five months responded to more words than the boy, Dr. Kellogg said. The superiority of the ape was probably due in large measure to her strictly human environment, he believes.

Other experiments, however, reported to the same meeting by Dr. Louis W. Gellermann, of Yale University, indicate that infants and apes do differ in reasoning ability even at that early age. One of the tests he gave in identical fashion to two babies and two chimpanzees was to distinguish between a triangle and a square in order to secure food. Human babies have greater ability to discover the relationship between the correct food box and the shape of the marker placed above it, Dr. Gellermann found.

The chatter of the babies as they puzzled over the boxes showed that they learn not alone by trial and error, but by thinking out the problem in words. This superior ability to "verbalize" distinguishes the mentality of humans from that of apes, Dr. Gellermann indicated.

Birth Injury Causes Deficiency

Birth injuries must be blamed for the unfortunate plight of about one-tenth of the cases confined to institutions because of mental deficiency, it was revealed by a survey conducted by Dr. Edgar A. Doll, of the Training School at Vineland, N. J., in collaboration with Dr. Winthrop M. Phelps, and

reported by Dr. Doll to the American Psychological Association.

A total of 435 institutionalized cases of mental deficiency were studied, and with 44 of these the mental trouble was caused by an injury at the time of birth. Motion pictures were shown by Dr. Doll which indicated that a peculiar stiffness of the body and spasms or wriggling, particularly of the hands and feet, are characteristic of these birth-injured mental defectives.

No Fear For Cat Scent

If rats have an instinctive fear of their natural enemies, the cats, this fear is not aroused by the scent of the cat, results of an experiment conducted by Dr. Margaret Wooster Curti, of Smith College, indicate. Dr. Curti reported her work to the Association.

White rats which had been isolated from cats from birth were observed when they were allowed to see a cat without being able to smell her and also when they were allowed to smell the odor of a cat without sight of her.

The rats, although the cat was a total stranger to their experience, did show marked and definite response. But in no case did they show any clear-cut evidence of fear in response to the cat odor alone.

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TYPOGRAPHY

Oldest Printing Blocks Brought to America

THE OLDEST printing blocks in existence, brought from their homeland in China, have been added to the rare exhibits of an American museum. Acquisition of the historic relics by the Field Museum of Natural History, is announced by Dr. Berthold Laufer, curator of anthropology, who obtained them while on an expedition in China.

The blocks are engraved with floral designs. They were made at some time earlier than the year 1108 A. D., Dr. Laufer reports. They were found in the ancient city of Chu-lu in Chi-li province

in eastern China. This city, submerged by flood centuries ago, has been excavated by archaeologists.

"The Chinese are the inventors of block-printing, and, in fact, of all the essentials for printing—paper, writing brush, ink, and ink-pallet or ink-stone," said Dr. Laufer. "The Chinese invented and perfected these entirely from their own resources, unaided by any other nation. Paper was invented and manufactured in China as early as A. D. 105. Under the Sung dynasty, which held sway from 960 to 1279, the printing of books from wooden blocks was a flourishing art."

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PHYSICS

Discovery of New Energy Form Predicted

THE DISCOVERY of a new type of energy within the atomic nucleus was predicted at York, England, by Dr. C. D. Ellis, physicist of Cambridge's famous Cavendish Laboratory, who spoke before the British Association for the Advancement of Science. Dr. Ellis is an associate of Lord Rutherford. He presented evidence that the energy distribution of electrons emitted by radioactive atoms like radium upsets the principle of the conservation of energy. The principle has been considered fundamental to physics.

In attempting to find a way out of this dilemma, Dr. Ellis suggested that



ARMED WITH POISONED BLADES

Renaissance bravos fought with a sword in one hand and a dagger in the other, but the lion fish, a dangerous South Pacific species, has a whole armory of blades—and they are all poisoned. Moreover, they break off like the famed glass daggers of Venice when they have pierced the flesh of the victim, leaving the point in the wound to lacerate it further and insure more complete distribution of the poison. The specimen here pictured is at the Field Museum of Natural History.

possibly there would come the discovery of a new type of energy in the bodies that emit beta rays or electrons.

Dr. W. O. Richardson, famous British physicist, maintained that the meaning of energy is indefinite within the nucleus or heart of the atom.

Hope that neutrons, the recently discovered atomic particles, can be used to reveal the structure of the atomic hearts was expressed by le duc Maurice de Broglie, French physicist, who described a peculiar absorption of neutrons by lead. M. de Broglie visualizes the neutrons as waves and he believes that they interfere with the hearts of lead atoms and are thus absorbed differently than would otherwise be the case. Further experiments, he hopes, will elucidate just what is within the nuclei or hearts of atoms.

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ASTRONOMY-GEOLOGY

Pacific Not Big Enough To Furnish Moon

THE MOON didn't come out of the Pacific Ocean basin.

So says D. Artur Neuberg, of Meissen, Germany, in flat contradiction to a widely held theory, that pictures the earth as "calving" the moon out of the Pacific Ocean basin in some remote geological period.

Choosing one of three proposed methods for calculating the total volume of the Pacific Ocean basin, Herr Neuberg arrives at an estimate of approximately 700 million cubic kilometers (167 million cubic miles). But the moon, with a diameter of 3,480 kilometers, has a volume of approximately 22 billion cubic kilometers (5 billion, 240 million cubic miles). The Pacific Ocean basin is therefore about 31 times too small to supply all the material needed.

Even if the Pacific, Atlantic and Indian oceans, together with all smaller seas, were scooped out to make the moon, they would not yield nearly enough material. According to Herr Neuberg's calculations, their collective volume is roughly one and one-third billions of cubic kilometers (319,200,000 cubic miles), or only one-sixteenth that of the moon.

Herr Neuberg sticks to the theory held by another school of geologists, that the earth and the moon were shot off together from the sun as a single egg-shaped mass, which subsequently separated into a larger body, the earth, and a smaller, the moon.

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ARCHAEOLOGY

Golden Goats' Heads Found In Ruins of Old Persian Palace

FIVE mountain goats' heads wrought in gold are among the long-buried art treasures of a Persian palace at Damghan, now restored to the light of day by American archaeologists.

First cabled reports of the discovery to the University of Pennsylvania Museum at Philadelphia, indicate that the Persian treasures may rival those of the royal tombs of Ur. Ruins at Damghan are being excavated by a joint expedition from the University Museum and the American Institute for Persian Art and Archaeology, led by Dr. Erich Schmidt.

The sumptuous array of jewelry and ornaments includes necklaces and diadems of gold, vessels delicately carved in alabaster, copper weapons and accoutrements, and cones made of gold

and silver. All of these adorned the persons or the palaces of Persian royalty 3,500 years ago.

Dr. Schmidt's cable does not tell where the treasure lay, but the Museum staff assumes that it was in a room of a small palace discovered by the excavators.

This palace appeared to have been buried by a natural catastrophe, probably by a fire, commented Horace H. F. Jayne, director of the Museum. The art objects in the ruins would confirm this hypothesis, for precious metals, seldom escape pillaging enemies.

The Persian treasure opens up new vistas of history, Mr. Jayne declared. The golden goats' heads, in particular, are important because they suggest affinities with the Sumerians.

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ASTRONOMY-PHYSICS

Shrinking Atom Alternative For Expanding Universe Theory

THE theory that the universe is expanding at a tremendous rate might also be called the theory of the "shrinking atom," Sir Arthur Eddington, British astronomer, reminded members of the International Astronomical Union at their meeting in Cambridge, Mass.

"All change is relative," he declared after summarizing the evidence that the universe is doubling its diameter once in 1300 million years, about the length of geologic time as measured in rocks here on earth.

"The universe is expanding relatively to our common standards; our common standards are shrinking relatively to the size of the universe.

"We walk the stage of life performers of a drama for the benefit of the cosmic spectator. As the scenes proceed, he notices that the actors are growing smaller and the action quicker. When the last act opens the curtain rises on midget actors rushing through their parts at frantic speed."

Sir Arthur credited Americans with

the observational work that laid the foundation for the expanding universe theory, mentioning Slipher, Hubble and Humason by name. Prof. W. de Sitter of Holland gave the first theoretical hint of an expanding universe in 1917 and just as predicted, the remote spiral nebulae appear to be running away from us and the velocity of recession increases in proportion to the distance.

But, said Sir Arthur, "they are not avoiding us—everyone is having the same experience."

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ENGINEERING

Corrosion Fought to Save Money for Industry

A NATION-WIDE battle against the loss of millions of dollars each year by the corrosion of non-ferrous metals and alloys is being waged by the American Society for Testing Materials.

The committee's program calls for the use of about 23,000 test plates of copper, tin, zinc, bronze and similar metals and alloys over a period of 25 years. The Society estimates that during the past five years cooperating companies contributed more than \$175,000 to the work as materials, special testing equipment, labor and funds.

The most extensive division of the program, which makes use of the greater part of the 23,000 specimens, studies atmospheric corrosion. Test plates of different metals are exposed to the atmosphere in various parts of the country.

Rural, Salty or Contaminated

The effect of rural atmosphere is being recorded on plates in open fields at State College, Pa., and Phoenix, Ariz. Seacoast air sometimes blows salt spray over the metals at Sandy Hook, N. J., and Key West, Fla. High humidity exerts its effect at Rochester, N. Y., and La Jolla, Calif., while contaminated industrial atmosphere surrounds plates at New York City and Altoona, Pa.

The results of weathering under these conditions are studied at definite intervals during the years of exposure by determining the change in weight of the plates and their loss of strength and ductility. A part of this work is being done at the U. S. Bureau of Standards in Washington under the direction of H. S. Rawdon, chief of the Division of Metallurgy.

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ASTRONOMY

Two Huge Telescopes Are Planned for United States

80-Inch Reflecting Instrument Will Be Built in Texas by Two Universities; Harvard Prepares For 61-Inch Mirror

A NEW ASTRONOMICAL observatory, equipped with an eighty-inch reflecting telescope, will rise upon the summit of a peak of the Davis mountains in western Texas within the next six years as the joint creation of the University of Chicago and the University of Texas, and the largest telescope in Eastern United States, a sixty-one-inch reflector, will soon be installed in the new Oak Ridge station of the Harvard College Observatory.

The new observing post of the stars in Texas will be one of the world's finest and it will be named the McDonald Observatory after William J. McDonald who left a bequest to the University of Texas. The University of Chicago will staff the observatory, and Dr. Otto Struve of the Yerkes Observatory at Williams Bay, Wis., will divide his time directing both observatories. The University of Texas will erect and maintain the McDonald Observatory.

The Davis mountains where the McDonald Observatory will be located have

ideal observing conditions. The University of Chicago is cooperating with the University of Texas in the new observatory because of the need of an observing point in the south companion to the Yerkes Observatory.

Cornerstone for the new Oak Ridge station to house the Harvard instrument was laid as a part of the ceremonies of the International Astronomical Union. It is located twenty-six miles from Cambridge near the town of Harvard, Mass.

To Reach All of Sky

The new telescope will be the fourth largest in the world. It will supplement the sixty-inch reflecting telescope now being erected at the other Harvard observing station in South Africa. The South African telescope will be the largest in the southern hemisphere. With the two instruments, the Harvard astronomers will be able to reach all parts of the sky.

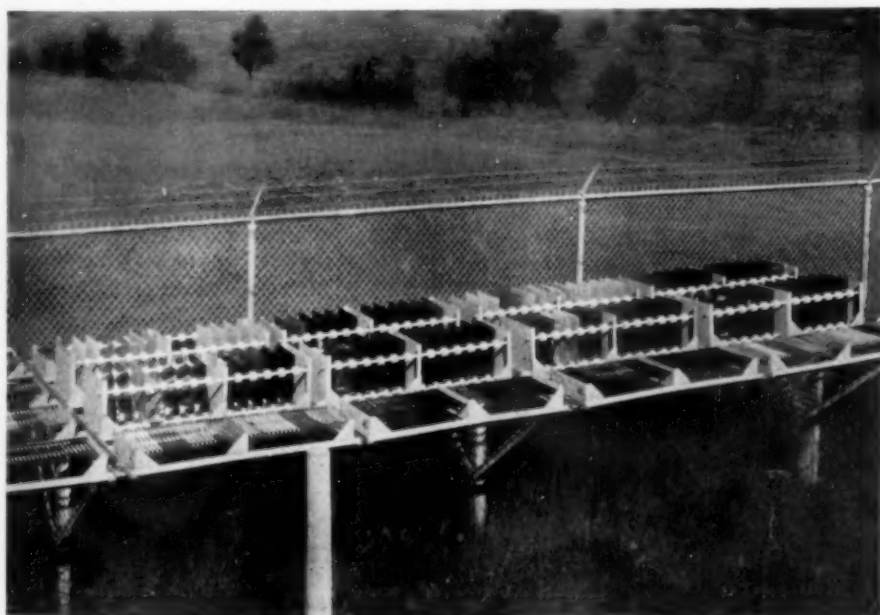
The new eighty-inch reflecting telescope for Texas will be exceeded in size only by the hundred-inch mirror now on Mt. Wilson, Calif., and the projected 200-inch telescope planned for southern California by the California Institute of Technology.

This instrument will be the most powerful in the world for some purposes. Dr. Struve explained that for the photography of faint nebulae and distant universes it will be as powerful as the 100-inch telescope on Mt. Wilson, now the world's largest. For other special tasks it will be even more powerful.

"It is not, however, our intention to surpass the remarkable performance of the Mt. Wilson telescope," Dr. Struve stated, "but rather do we hope to supplement it and to develop such features which, for one reason or another, are omitted at Mt. Wilson. It is our desire to make our work supplementary to that of other institutions and to avoid duplication of any sort."

The concave mirror on which the starlight falls will be 80 inches in diameter, and the beam will be focussed 27 feet above.

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ON QUARTER-CENTURY TEST

Scientists are learning from these plates of non-ferrous metals exposed to the weather at State College, Pa., how to save a part of the millions lost each year through the corrosion of such metals in industry.

ARCHAEOLOGY

Another Great Wall

Ancient Wall in Peru Discovered by Aviator-Explorers Rivals Similar Structures in China and Europe

By EMILY C. DAVIS

THE GREAT WALL of China, winding like a mighty, protecting serpent along the old northern boundary of the Celestial Kingdom—

Hadrian's Wall, the Great Wall of Britain, built and fortified to shut the barbarians of the north out of southern Britain in Roman days—

And now, added to this small, select list of Great Walls in the world is an American entry—the Great Wall of Peru, which has been discovered by explorers flying over the Andes.

The American Wall was built with hard labor by an Indian people called the Chimú who had an important civilization long ago on the Pacific coast of Peru, until finally they were swallowed up in a terrific struggle by the powerful empire of the Incas.

That a Great Wall, many miles long, should be hidden or lost or forgotten, seems incredible. A Great Wall would seem to be as conspicuous as the proverbial white elephant. But the Great Walls of China and Britain have had a way of fading out of sight for many centuries and coming to light again in modern times. And the new-found Wall of Peru is just like them.

How very, very inconspicuous a Great Wall can be was proved by the Chinese Wall, which was unknown outside of Asia for almost two thousand years. And this is a barricade 1,500 miles long—half the width of the United States. As late as fifty years ago, articles were actually written arguing that the Chinese Wall was a myth.

In England, archaeologists are still discovering Hadrian's Wall, which runs clear across the island, from east to west, for 73 miles. The course of this old Roman Wall, up and down hills and valleys, is pretty thoroughly traced now, but only last year a brand new fort along the wall was unearthed, with much excitement in England. And something new may be dug up along the route of Hadrian's Wall now and again for some years to come.

As for the Great Wall of Peru, it has just gained the world's attention for the

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first time. The long wall was sighted from the air unexpectedly as the recent Shippee-Johnson Peruvian Expedition flew over the foothills of the Andes.

Never having heard of any barricade of such size in Peru, the surprised explorers, Robert Shippee and George M. Johnson and their party, studied their air photographs and puzzled over them and finally decided to make another flight, to trace the length of this mysterious barricade. This time the flying explorers started from a point near the Pacific coast where ruins of a village lie buried. There the Great Wall springs up.

Runs From Sea To Mountains

The whole Pacific coast of Peru is a desert strip of sand about fifty miles wide, cut across by a number of rivers which make the land habitable. East of that desert, the Andes begin.

The Great Wall crosses this sandy coast and rises into the foothills. It was apparently built to follow the Santa River from sea to mountain. In many places the barricade wanders more than a mile from the river. Occasionally it comes close, even crossing the river's path. Neither hills nor gullies stopped the progress of the Wall.

Like the Chinese Wall and the Wall of Hadrian, the Great Wall of Peru was strengthened by a series of forts. The discoverers sighted fourteen of these forts. They stood on both sides of the Wall and at a short distance from it. Some of the forts are circular, some are rectangular. Most of them were cleverly set in the tops of small hills, where they could be quite invisible from the valley floor.

As the fliers followed the wall up into the Andes, at an elevation of 10,000 feet in the mountains they lost the trail. Weather conditions were against them. The light was failing. But they had succeeded in following the trail for more than forty miles. They had seen enough to convince them that this construction project of ancient America ranks with remarkable feats of the past.

Viewed from an airplane over the Andes, the Great Wall of Peru is a seam, a long, fine scar on the face of the

mountains. After the fliers had surveyed it from the air, they set out in an automobile and on foot to examine it at close range.

They found a tall, crumbling rampart of mud-cemented boulders. Where it crosses gullies it rises as high as 20 or even 30 feet. The average height appears to have been 12 to 15 feet. At the base it was about 12 to 15 feet thick. Toward the top of the thickness tapered.

Undoubtedly, this stone barrier has been stumbled over for years by explorers who could not see what it was. To think of anything so large being invisible is a strain on the imagination. But the Great Wall of Peru was just that invisible.

The reason is that Peru is criss-crossed with walls. They run here and there for short distances, enclosing forts, bounding fields. Many of the old barricades are broken lines not easily followed. Peruvian walls in general have been called "mysterious." So, groundling explorers who saw broken portions of the Great Wall would have thought little of it. Not until explorers took wings could its long sweep be detected.

Now that the Great Wall has been revealed by aerial photography, there is real surprise that so big a monument was never mentioned in early historic writings about Peru. The Spanish conqueror Pizarro and his men, who were so curious about all the wonders of the Incan Empire in Peru, seem to have heard nothing about a Great Wall.

Unknown To Spaniards

The Spaniards exclaimed over the long, smooth highways built by the Incas for their armies to march over. They marveled to see Incan temples built of stone and shining in gold and jeweled ornaments. They took the keenest interest in the intricate communist system of the Incan government. And chroniclers who accompanied Pizarro busily wrote down impressions about these things.

Was the Great Wall already a ruin, forgotten, when the Spaniards conquered the Incas in the sixteenth century? That might account for the silence of history on the subject.

A number of archaeologists have been asked their opinions on the Great Wall by the American Geographical Society, and there is virtual agreement on one point. That is that the builders of the



WALL BUILDER

A likeness of one of the prehistoric Indians who built the Great Wall of America—a Chimú Indian, as portrayed on a carving on a Chimú vase.

Great Wall of Peru were the Chimú Indians.

All the circumstantial evidence points to the Chimú. The Great Wall lies within their 400-mile strip of kingdom. They were living in the region when the Great Wall must have been built, for they occupied the coast from very early centuries of the Christian era. If further argument is needed, the Chimú were skillful at construction—they built steep pyramids of sun-dried brick, some taller than modern ten-story buildings. And the Chimú were fierce and aggressive fighters.

There is a famous Chimú vase painting which shows a whole row of hand to hand combats between Chimú warriors and some opponents. Such a scene gives a pretty good idea of what Indian fighting must have been like along the Great Wall of Peru.

In the series of duels painted on this vase, the best dressed contestant, the Chimú warrior, is winning every time. And that is no wonder. For the winners are protected about the head by pointed helmets of wood and cotton with chin straps and ear plates and a flap down the back of the neck. These warriors wear armor jackets, probably made of slats of wood laced together. And they are loaded down with shields, battle

axes, wicked-looking maces, and other accessories for close combat. War paint on faces and legs completes the fighting outfits.

Some of the enemy in this fight have helmets to wear. But most of them have only tasseled caps to save their heads from bludgeon blows, and those bobbing tassels are proving bad war psychology. A winning Chimú may simply grab an enemy by the tassel of his cap and drag the captive off, helpless. These enemy soldiers have little or no body protection. And while their shields and maces look like good equipment, still the armored opponents have the best of every contest. By use of dotted lines, the artist shows how blood spouted from the wounded.

The hard question for science to answer about the Great Wall of Peru is: How old is the wall? If archaeologists can dig along the foot of the wall and inside of its forts, they may find tools or pottery lunch dishes and drinking cups belonging to the workmen who built the Great Wall. Or they may dig up some of the war clubs and battle axes of the soldiers who defended and attacked it. Studying the types of such articles would greatly aid in discovering the age of the wall.

From what is known of the Chimú Indians, a Great Wall would have come in handy at almost any period of their busy career. When the Chimú were a young and rising tribe in north coast Peru, they were engaged in fighting civil wars among their own neighbors and as the stronger groups dominated, a kingdom came to be welded into shape, and the borders of the kingdom were pushed out to new limits along the Pacific coast.

Chimú Put Up Big Fight

Later, the Chimú had to defend themselves against Indians from the highland of Peru. And then, somewhere between 1000 A. D. and 1300 A. D., the Chimú had to put up the fight of their lives for their kingdom and its ruler, the Grand Chimú. For the conquering Incas, or "nobles," came marching across the mountains, determined to add Chimúland to their great Indian empire.

Experts on Peruvian archaeology differ in their views as to which age of Chimú fighting brought the Great Wall into existence. Dr. R. L. Olson of the University of California suggests that the Great Wall may have been a defense structure built by the early Chimú, as they extended their territory to north and south.

Prof. Marshall Saville of the Museum

of the American Indian, Heye Foundation, theorizes that the wall was built by the Chimú to prevent neighboring Indian tribes from gaining access to the Santa River.

The Santa Valley was densely peopled, he points out. If nearby tribes succeeded in diverting the stream, the Chimú people of the valley would have been in a desperate plight.

One Spanish historian states that the Incas finally conquered the Chimú by cutting off the water supply. And another historian says that it was in the Santa Valley that the Chimú ruler finally surrendered to the Incas. Prof. Saville points out these two historic references, and suggests that possibly the Great Wall was built in the last stand of the Chimú against the victorious Incan siege.

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ARCHAEOLOGY

Tomb Wall Built on Dead Man's Chest

A SECOND tomb of Monte Alban, eclipsed when it was discovered by the sensational find of treasure in another, is described as of great scientific importance in an official report being prepared by archaeologists of the Mexican National Museum.

A buried underground chamber lined with stone, entered through a passageway, first revealed remains of two pairs of leg bones. A transverse wall had cut the skeletons at the ribs. When it was removed, it disclosed a second room with the skulls on the other side of the wall, as if the partition had been built upon their chests.

The skulls rested on a pair of large pottery incense burners with long handles like dippers. Between them sat an idol-urn of a god thought to be Quetzalcoatl, the feathered snake, painted red with cinnabar, the Mexican funeral color. His headdress is of plumes, his tongue bifurcated like a serpent's and his upper jaw is like a tiger's. His ornaments are seashell symbols appropriate to Quetzalcoatl.

One door jamb of the tomb has unreadable Zapotecan glyphs, and a great quantity of pottery and other objects was contained in the tomb. A curious thing was a big pottery pipe two feet long and five inches in diameter. Similar tubes were found in other graves. In five out of the six intact tombs explored, plural burials had been made by the ancient people.

Science News Letter, September 17, 1932

ECONOMICS

Wheat Production Increase Outstrips Consumption

MANKIND is growing wheat much faster than it is eating it, so that much of the present distress in agriculture is due to an evil long familiar to manufacturing—simple overproduction. This was the thesis of an address by G. V. Jacks, of the staff of the Rothamstead Experimental Station, delivered before the meeting of the British Association for the Advancement of Science at York.

During the last twenty years the world's wheat area has been increased by over 20 per cent., and production by over 25 per cent.; the increase in population over the same period has probably not been more than 14 per cent., Mr. Jacks said. The causes of this overproduction have been very complicated, and are hard to analyze; but economic, scientific and political factors have all played their parts.

Science News Letter, September 17, 1932

BOTANY

Plant Sociology Organizes Common-Sense Knowledge

PLANT sociology, the youngest and newest of the great family of plant sciences, was the subject of a radio talk given under the auspices of Science Service by Dr. H. S. Conard, professor of botany at Grinnell College. The talk went on the air over the network of the Columbia Broadcasting System.

Although its definite history dates back only about fifteen years, the real roots of plant sociology are in the much older common-sense knowledge of plants as they occur in nature, Dr. Conard said. It attempts to put in order what all field botanists, farmers, foresters and flower lovers know, and to enrich and deepen and organize this knowledge.

"The word sociology can be applied to plant life only in a somewhat figurative way," Dr. Conard continued. "In human society we have the conscious co-operation of individuals or the conscious lack of cooperation, directed to the accomplishment of some aim or plan for future achievement. Obviously this does not occur in plant societies. Trees may get their heads together, but they do not lay plans.

"But there are also many social relations in human and animal societies which come about without planning.

The mere existence of two persons within the ken of one another brings about a social relation. It is in this latter way that plant sociology resembles the sociology of August Comte. Plants do live together in social units, each plant having an influence upon all the plants in its vicinity. This sociology, both of humans and of plants, has to do with the life organisms in social units, as distinguished from the life of the individual by and for itself."

Plant sociology is only beginning its development in this country, Prof. Conard said; but it is well evolved in Europe, and already has its practical applications there. European foresters visiting this country often pay little attention to the trees in American forests, but examine minutely the shrubs and mosses that grow beneath them, because these lesser plants are highly significant as indicators of the health and vigor of the forest, and of its probable course of development.

Dr. Conard is himself a pioneer in the introduction of the study of plant sociology in America. With Prof. George D. Fuller of the University of Chicago, he has translated into English a universally used work on the subject, which will be published this fall.

Science News Letter, September 17, 1932

PSYCHOLOGY

Babies' Appreciation For Color In Art Tested

YOUNG children have a gradually increasing appreciation for artistic coloring in pictures long before they reach school age, it is indicated by an experiment conducted by Dr. Ada Hart Arlitt, assisted by Pessa Polasky, at the Pre-School Laboratory of the University of Cincinnati. Dr. Arlitt reported the results of the experiment to the American Psychological Association.

The psychologists, in an effort to discover whether such young children have a preference for harmoniously colored pictures, showed the youngsters twenty masterpieces of art first in their original colors and then colored to violate the laws of color harmony. Increasing numbers of the children preferred the original masterpieces.

Colored pictures are preferred to black and white by about 60 per cent. of all age groups from two to four years. When the children were given a choice between primitive pictures and samples of modern art dealing with the same subject matter they showed no discrimination between them.

Science News Letter, September 17, 1932

IN SCIENCE

ASTRONOMY

Photo Shows Corona Three Diameters From Sun

ONE STREAMER of the sun's corona extended for at least three diameters from the sun at the time of the August 31 total eclipse. This is shown on a photograph taken by Dr. P. M. Millman of Harvard College Observatory with a short focus lens, an 88-second exposure, and plates sensitive to infra-red or long wave "heat" light. So far this is the longest extension reported by any observers of the recent eclipse.

Science News Letter, September 17, 1932

PSYCHOLOGY

Students Less Neurotic Than Married Couples

MARRIED couples are more neurotic than college students, Dr. Raymond Royce Willoughby of Clark University told the Psychological Association. He reported a study of 160 married couples and an equal number of college boys and girls.

"Both husbands and wives were more neurotic than the college students of the same sex used as controls," Dr. Willoughby said. "The difference was moderate in the case of the husbands and marked in that of the wives."

But be careful how you use this in an argument with your wife or husband; for Dr. Willoughby found that a tendency to ascribe neuroticism to the spouse is associated with neuroticism in the individual himself.

Husbands are afraid of meeting the important person at a reception. Wives are easily moved to tears. Men students get stage fright and become depressed because of poor marks. Girl students say things on the spur of the moment which they later regret and they are also troubled with ideas running through their heads so that they cannot sleep. Dr. Willoughby also found that the greatest differences between husbands and wives, all in favor of the husbands, are: Fear of lightning, getting tired of work easily, stage fright, being easily moved to tears.

Science News Letter, September 17, 1932

EN FIELDS

PSYCHOLOGY

Delayed Reward Loses Effectiveness

IF THE BEHAVIOR of rats has any lessons for human beings, it is not so helpful in teaching a child to tell him when he is good that next week he can go to the movies. Better give him a piece of candy or a pat on the head immediately.

Experiments in teaching white rats to follow a maze or to choose between black and white to receive a reward, demonstrate that as the reward is delayed, it decreases in effectiveness with extreme rapidity, Dr. John B. Wolfe, of the University of Illinois, reported to the American Psychological Association.

Delays of 5 and 30 seconds, and 1, 2½, 5, 10, and 20 minutes were used with trials of no delay for comparative purposes.

Science News Letter, September 17, 1932

PHYSIOLOGY

Taking Alcohol Shown To Increase Acidity of Blood

THE INGESTION of alcohol leads to definite changes in the blood, some of which can be used to explain common symptoms of alcoholism. This is the general conclusion reached in a series of studies just completed by Dr. Harold Himwich, Delafeld DuBois, and associates in the physiological laboratories of the Yale Medical School.

Dr. Himwich, who is well known in the field of carbohydrate metabolism, has directed his activities toward the metabolism of alcohol in order to see how the body is able to burn this substance.

Thirty dogs and eleven human subjects were tested following the administration of 19 per cent. alcohol in doses comparable to a tumblerfull of whiskey. Chemical analyses of the carbon dioxide content, the carbon dioxide capacity, for lactic acid, glucose alcohol and determinations of the acidity of arterial blood were all made before and after the doses of alcohol were absorbed.

The results in man and dog were similar; that is, both showed the subject in question to be in a state of acidosis. The increase in the blood sugar was particularly striking. So was the increase in the acidity of the blood, determined by a cleverly made glass electrode which Mr. DuBois has perfected so that it can reveal the smallest change in acidity values for blood that have as yet been measured. And it was the lactic acid alone which seemed to be responsible for this acidosis.

"The picture of the acidosis is a complete one," says Dr. Himwich, and due, we feel, to the narcotic action of the alcohol."

Alcohol depresses the respiratory centers in the brain and so allows acid to accumulate in the blood. It also favors the breakdown of glycogen stored in the liver and muscle to glucose and lactic acid

Science News Letter, September 17, 1932

PALEONTOLOGY

100,000-Year-Old Ice Box Yields Treasure of Fossils

A NATURAL refrigerator that has kept animal bones and plant remains intact ever since the Ice Age—a hundred thousand years or more—is reported by Prof. Albert S. Wilkerson of Alaska Agricultural College and School of Mines, Fairbanks, to the American Museum of Natural History.

The refrigerator consists of a series of beds of frozen muck overlying gold-bearing gravels. To get at the gold, the mining company that is exploiting the gravels brings water ninety miles across country in a great ditch, and uses it to melt frozen muck and sluice it away. This naturally uncovers the bones, tree stumps and other objects that have been frozen in for ages.

The animals whose bones Prof. Wilkerson has sorted out of the muck include mammoths, giant bison, extinct horses, caribou, an occasional moose, and many rodents. The tree stumps are apparently spruce. Rodent nests are made of long, coarse grasses and sedges. There are many beds of peat, and occasional frozen lumps of green moss, which disintegrate on thawing.

A notable discovery by Prof. Wilkerson in the frozen muck consists of beds of volcanic ash, almost entirely composed of minute fragments of obsidian. This indicates that the volcanoes of Alaska were active during the formation of the muck beds.

Science News Letter, September 17, 1932

ASTRONOMY

Great Shooting Star Shower Predicted For November

HOPES for a great shower in November of the Leonid meteors were held out to astronomers attending the fourth meeting of the International Astronomical Union by Dr. Charles P. Olivier, director of the Flower Observatory of the University of Pennsylvania, in his report as president of the commission on shooting stars.

"During the past four years," he said, "the most important events in meteoric astronomy have been the good showers of the Leonids in 1930 and 1931. When these observations are added to the predictions based on computations of the perturbations, there is good reason to hope for an even better shower in 1932, perhaps rivalling that of 1866."

It was urged that studies be continued of the three principal places in the world where great meteors are supposed to have struck the ground. One of these is in Arizona, another in Siberia, and the third in the Adrar in North Africa. Exploration of the latter is considered particularly urgent, because the exact location of the mass is unknown at present, and the danger from shifting sands of the Sahara Desert may prevent scientists from finding it if the search is too long delayed. A preliminary report on it was published in France in 1923, according to M. Jean Bosler of the Observatory of Marseilles. Then it was estimated to be 300 by 120 by 120 feet in size and to weigh a million tons. M. Bosler stated that a search for it would be fairly easy, provided French troops were provided to protect the party from the bandits which are the greatest danger.

Science News Letter, September 17, 1932

PSYCHOLOGY

Oldest Child Most Likely To Become College Student

COLLEGE classes contain a disproportionately large number who are the eldest in the family, a survey conducted by Dr. Mazie Earle Wagner, of the University of Buffalo, indicates. Dr. Wagner reported her study to the American Psychological Association.

The number of middle-of-the-family children was disproportionately small, she said. The survey also indicated that eldest children do better on college aptitude tests.

Science News Letter, September 17, 1932

PALEONTOLOGY

Cuvier on the Value of Fossils

"A Classic of Science"

The Great Naturalist Who Died Just a Century Ago Was One of the First to Use Fossils to Date Rock Deposits

A DISCOURSE ON THE REVOLUTIONS OF THE SURFACE OF THE GLOBE, and the Changes Thereby Produced in the Animal Kingdom. By Baron G. Cuvier, Translated from the French. London: Whittaker, Treacher, and Arnot, 1829.

IN MY WORK on Fossil Remains, I proposed to determine to what animals those fragments of bones should be assigned which occupy the superficial strata of the globe. It was attempting to traverse the whole of a region of which as yet the first approaches were scarcely known. An antiquary of a new stamp, it was necessary at the same time to restore these monuments of past revolutions, and to detect their meaning: I had to collect and arrange in their original order the component relics; to re-model the creatures to whom the fragments belonged; to reproduce them in their just proportions and with their proper characteristics; and then to compare them with those beings now existing:—an art almost unknown, and which implies a science scarcely before even glanced at,—that of the laws which preside at the co-existence of the forms of the various parts of organized beings. For such an attempt it was necessary to prepare myself by long and indefatigable researches into the structure of living animals; by a survey of nearly the whole mass of created beings now existing, which alone could lead me to a certain and determinate result in my speculations on the ancient creation: this would at the same time afford me a great result of rules, and affinities not less useful, and the whole animal kingdom would thus, in some measure, become subjected to new laws, resulting from this essay on a small portion of the theory of the earth.

I was supported in my twofold labours by the interest which it seemed to evince both for anatomy, the essential basis of all those sciences which treat of organized bodies; and for the physical history of the globe, the foundation of mineral-

ogy, of geography, and, we may say, of the history of man, and of all which it most imports him to know in relation to himself.

If we are interested in tracing out the nearly effaced vestiges of the infancy of our species, in so many nations utterly extinct, why should we not seek to discover, in the obscurity which envelopes the infancy of the earth, relics of revolutions long anterior to the existence of all nations? We admire that power of the human mind, the exercise of which has enabled us to ascertain those motions of the planets, which Nature seemed for ever to have held from us; genius and science have soared beyond the limits of space; some observations, developed by reason, have detected the mechanism of the world. Would it not be some renown for a man, in like manner, to penetrate beyond the limits of time, and to discover, by research and reflexion, the history of this world, and of a succession of events which preceded the birth of the human race?

Astronomers have advanced in science more rapidly than naturalists; and the present state of the theory of the earth somewhat resembles that of the period when certain philosophers believed heaven to be formed of polished freestone, and the moon in size like the Peloponnesus; but, after Anaxagoras, have arisen Copernicus and Kepler, who paved the way for a Newton; and why should not natural history one day boast also of her Newton? . . .

Progress of Mineral Geology

In truth, the mineral portion of the great problem of the theory of the earth has been studied with admirable care by Saussure, and brought to a wonderful development by Werner, and by the numerous and talented disciples of his school.

The former of these celebrated men, scrutinising with indefatigable toil for twenty years the most inaccessible mountainous districts, in a manner attacking the Alps themselves in every direction,



Baron Georges Léopold Chrétien Frédéric Dagobert Cuvier, 1769-1832.

in every defile, has laid open to us all the confusion of the primitive formations, and has clearly traced the secondary formations. The latter, availing himself of the numerous excavations made in countries containing the oldest mines, has fixed the laws relating to the succession of layers; he has pointed out their relative antiquity, and traced each through its respective change. It is he, and he only, who has given a date to geology, as far as regards the mineral nature of the layers; but neither Saussure nor Werner have determined the fossilized organized species in each sort of layer, with that necessary exactness which is so requisite, from the prodigious number of known animals which they contain.

Other men of science indeed studied the fossil relics of organized bodies; they collected and published drawings of them by thousands; their works will be valuable collections of materials; but, more engrossed with animals of plants, considered as such, than with the theory of the earth, or, regarding these petrifications or fossils as curiosities rather than historical documents, or, in truth, contenting themselves with partial explanations on the relative bearings of each relic, they have almost always neg-

lected to seek for the general laws of position, or the relation of fossils with the layers.

Importance of Fossils in Geology

And yet the idea of such a research was very natural. How was it overlooked that it is to fossils alone that must be attributed the birth of the theory of the earth; that, without them we could never have surmised that these were successive epochs in the formation of the globe, and a series of different operations? Indeed they alone prove that the globe has not always had the same crust, by the certainty of the fact that they must have existed at the surface before they were buried in the depths where they are now found. It is only by analogy that we extend to primitive formations that conclusion which fossils enable us definitively to ascribe to secondary formations; and if there were only formations without fossils, no one could prove that these formations were not simultaneously produced.

Again, it is to fossils, small as has been our acquaintance with them, that we owe the little knowledge we have attained respecting the nature of the revolutions of the globe. They have taught us, that the layers which comprise them have been undisturbedly deposited in a liquid; that their alterations have corresponded with those of the liquid; that their exposure was occasioned by the removal of this liquid; that these exposures have taken place more than once. None of these facts could have been decided on without these fossils.

The study of the mineral portion of geology, which is not less necessary, which is even of still greater utility with regard to the mechanical arts, is yet much less instructive with relation to the object of which we are treating.

We are in positive ignorance regarding the causes which can have produced the changes of the substances composing the layers; we do not even know the agents which could have held certain of them in solution; and it is yet a matter of controversy, whether certain of them owe their origin to water or fire.

FOUCAULT

inaugurated the series of modern determination of the speed of light. He describes his method in

THE NEXT CLASSIC OF SCIENCE

To come at once to the point, we observe that there is a general agreement on one point only; namely, that the sea has changed its situation. And how should we know that if we had no fossils?

Fossils, which have given birth to the theory of the earth, have also furnished it with its principal lights, the only ones which have been generally recognized down to the present period.

It is this idea which has encouraged us to take up the subject; but the field is immense; a single person could only glance over but a very trifling part. A choice was to be made therefore, and we did not hesitate. The class of fossils which forms the object of this work at once determined us, because we saw that it is at the same time more pregnant with precise results, and yet less known and more rich in novel matters of research.

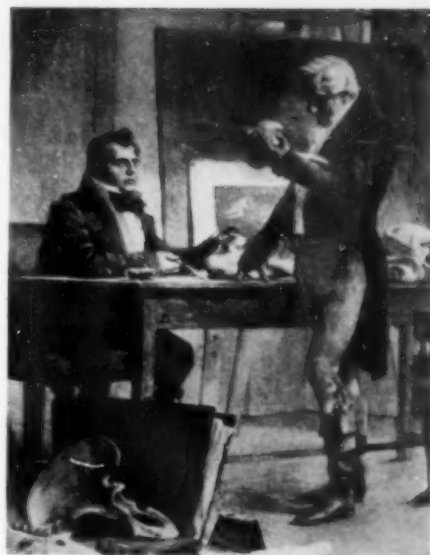
Paramount Importance of the Fossil Bones of Quadrupeds

It is apparent, that the bones of quadrupeds conduct us, by various reasonings, to more precise results than any other relics of organized bodies.

In the first place, they characterize more clearly the revolutions which have effected them. Shells prove that the sea was once where they are now found; but their change of species could only at the utmost proceed from slight variations in the nature of the liquid or merely its temperature.

They might have had relation to causes still more accidental. There is nothing to assure us that at the bottom of the sea, certain species, even certain genera, after having occupied for a larger or shorter period determinate situations, have not been forced away by others. Here, on the contrary, all is precise; the appearance of the bones of quadrupeds, particularly the whole carcasses in the layers, betokens either that the layer itself which contains them was formerly dry land, or that there was terra firma in its immediate vicinity. Their disappearance renders it certain that this layer was inundated, or that this dry land ceased to exist. It is then by these that we learn in a positive manner the important fact of the repeated irruptions of the sea, with which shells and other marine productions could not have made us acquainted; it is by studying them profoundly that we may hope to ascertain the numbers and periods of these irruptions.

Secondly, the nature of the revolutions which have altered the surface of the globe must have exercised a more entire action over terrestrial quadrupeds



CUVIER COMPARING FOSSILS

—from a painting by Chartran in the Sorbonne in Paris

than marine animals. As these revolutions have in a great measure consisted in changes of the bed of the sea, and the waters must have destroyed all the quadrupeds which they reached, if the irruption were general, the whole class must have perished; or, if only operating on certain continents, it must have destroyed at least the species peculiar to these continents, without exercising the same influence upon marine animals. On the contrary, millions of aquatic individuals might have been left on dry land, or buried under new layers, or thrown with violence on the shore, and their race be still preserved in some places more tranquil, where it might again be propagated after the disturbance of the waters had ceased.

Thirdly, this action, as more complete, is more easily seized on; it is more easy to demonstrate its effects, because, the number of quadrupeds being limited, the greater part of their species, at least of the larger kind, being known, we have still further means afforded us of ascertaining whether the fossil bones belong to one of them, or if they formed a part of a species now extinct. As we are, on the contrary, very far from knowing all the marine testacea and sea fish; as we are probably ignorant yet of the greater part which are in the depths of the ocean, it is impossible to know with certainty if a species found fossilized be or be not extinct. Thus we observe learned men obstinately bent on giving the name of pelagian shells, that is, shells of the deep sea, to belemnites, to cornua-ammonis, and other shelly relics, which have as yet only been ob-

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served in ancient layers; meaning by that, that if they have not been yet found in a living state, it is because they inhabit depths beyond the reach of our nets.

Certainly naturalists have not yet traversed every continent, and do not even know all the quadrupeds which inhabit the countries over which they have traveled. New species of this class are from time to time discovered; and those who have not attentively examined all the circumstances of these discoveries, might believe also that the unknown quadrupeds whose bones are found in our layers have remained concealed to the present time in some islands not yet discovered, or in some of the vast deserts which occupy the middle of Asia, Africa, the two Americas, and New Holland.

However, if we examine what species of quadrupeds have been recently found, and in what circumstances they have been discovered, we shall see that there is but little hope of ever finding those that we have only seen as fossils.

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(From Page 177)

The mounting of the McDonald telescope will be similar to that of the 72-inch reflector at Victoria, B. C., and the 69-inch at the Perkins Observatory, Delaware, Ohio, with a long axis in the north and south line, supported between two concrete piers, and inclined at an angle equal to the latitude of the observatory. This turns from east to west once a day to compensate for the motion of the earth. Another axis at right angles to this, and supported in its middle, permits the instrument to move in a north and south direction. The new instrument will differ from those at Victoria and Delaware, however, in that it will be possible to bring the starlight, concentrated by the telescope, into a closed room of constant temperature where it can be analyzed by spectroscopes and other instruments capable of use only in a physical laboratory. Such instruments cannot ordinarily be attached to the moving end of a telescope. A similar arrangement is possible with the two great telescopes at Mt. Wilson.

Dr. Struve has listed the following problems which the new telescope is expected to attack:

The study of the chemical composition of the atmosphere of the stars.

The study of the properties of matter exposed to temperatures ranging from 3,000 to 50,000 degrees or more.

The study of distant universes, which involves a test of the Einstein theory.

The study of the composition of gaseous nebulae, of comets, planets, etc.

The new observatory is made possible by the bequest of the late William J. McDonald of Paris, Texas, who died in 1926 and left to the University of Texas a fund now slightly in excess of \$840,000 for an astronomical observatory. The University of Texas will own the McDonald Observatory but the University of Chicago will provide the staff. Its program will be coordinated with that of the present Yerkes Observatory.

Science News Letter, September 17, 1932

SEISMOLOGY

Colima Earthquake Located Off Mexican West Coast

THE EARTHQUAKE that shook the city of Colima, Mexico, on Wednesday evening, Sept. 7, originated at sea a short distance off the coast, the U. S. Coast and Geodetic Survey stated after examining reports from seismological observatories transmitted through Science Service. The epicenter was in latitude 18 degrees north, longitude 105 degrees west. Time of origin was 8:41 p. m. eastern standard time.

Science News Letter, September 17, 1932

Two complete test laboratories, applying the most up-to-date methods of grocery store management, are being set up in Philadelphia by the grocery trade interests of the city in cooperation with the U. S. Commerce Department.

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The Science Service radio address next week will be on the subject,
SCIENCE IN FOOD PRODUCTION
by
Dr. R. A. Pearson
President of Maryland University
FRIDAY, SEPT. 23
at 1.15 P. M., Eastern Standard Time
Over Stations of
The Columbia Broadcasting System

EVOLUTION-CHEMISTRY

Gorilla Replaced by Gibbon As Nearest Ape Relative

MAN'S EVOLUTION as a physical being began with a creature resembling the gibbon, not with one like the gorilla or the chimpanzee. Such is the opinion of Dr. C. Tate Regan, director of the Natural History Museum of London, as presented before the meeting of the British Association for the Advancement of Science meeting in York. The gibbon is a long-armed, tree-dwelling ape of the East Indian region.

Dr. Regan's opinion is based in part on noses. Man and gibbon have short, broad nasal bones, whereas the bigger anthropoids have long, narrow nasal bones fused together.

Furthermore, while man's descent has been, paradoxically, uphill, the gibbon's has been a real descent—going down. Dr. Regan holds that man and the apes had a common ancestor more advanced than the gibbon.

The principal continents of the earth have each its separate tale to tell of monkey life, the speaker continued. North America's is the shortest and simplest of these annals: North America never had any monkey inhabitants. The catarrhines, or narrow-nosed monkeys, originated in Africa. The platyrrhines, or broad-nosed monkeys, the ones that use their tails as extra hands, have their ancestral home in South America. The tarsoids, a lower group of monkey-like creatures, are traceable to Europe. Neither of these three groups was ancestral to the other two: they have all descended independently of each other from the original monkey family tree.

Molecular Weight of 30,000

How big is a molecule of cellulose, and how is it put together?

This question, which is of practical importance as well as scientific, because cellulose is the principal constituent of all wood, as well as of cotton, flax, rayon and other textile materials, occupied much of the attention of chemists attending the meeting of the British Association. The more chemists know about size and makeup of the cellulose molecule the more they can do with it.

Prof. W. N. Haworth of Birmingham University said that the cellulose molecule is a chain composed of glucose units arranged as rings. The ends of the

chain are chemically "loose," not looped back on themselves. The molecular weight of cellulose, he stated, is about 30,000; this indicates that the molecule is, comparatively speaking, enormous: the molecule of glucose for example has a molecular weight of only 180.

German chemists have been trying to measure the length of the cellulose molecule, but they are still in rather wide disagreement. Prof. H. Staudinger of the University of Freiburg stated that one of these chain-molecules is 4,000 Angstrom units long, while Prof. Hermann Mark of the University of Karlsruhe found a length of only 600.

An Angstrom unit is the inch of the light-measuring physicist. It is one ten-millionth of a millimeter, and a millimeter is about the width of a pencil mark.

Science News Letter, September 17, 1932

PSYCHIATRY

Response to Suggestion Differs with Mental Disease

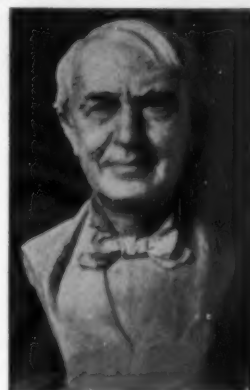
PATIENTS with different types of mental disease respond in very different ways to a test of suggestibility, Dr. Griffith W. Williams told the American Psychological Association.

The test, which is one which has been used with normal persons, consists of blindfolding the patient and then suggesting to him that he is falling forward. A record is then made of his bodily movements.

Patients with the mental disease

known to psychiatrists as catatonic dementia praecox were the most responsive to suggestion but responded in a negative way. Those of the paranoid group tended to respond positively to the suggestion. Those with manic-depressive insanity, tested while in the manic phase, showed a tendency not to respond in any way to outside suggestion. In view of the fact that these patients are very easily distracted, this result gives psychologists a new basis for distinguishing between suggestibility and distractibility.

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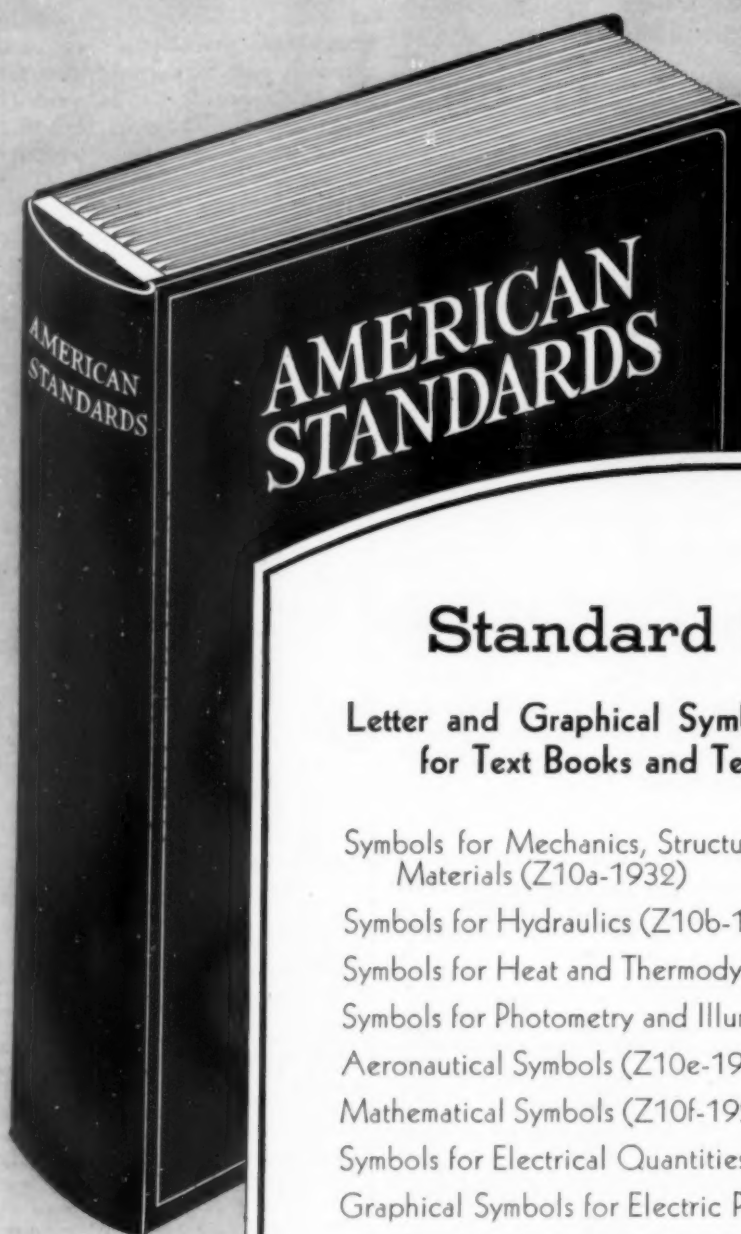
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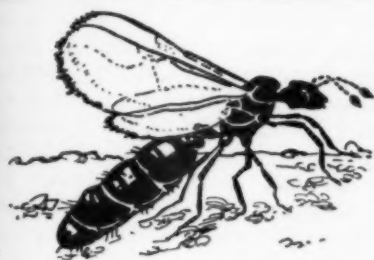
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ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone



Xylophagists

TERMITES, or "white ants," which are abundant enough to be serious pests in many warmer sections of the United States and are spreading even into the cooler regions, are wood-eaters. They devour house timbers, telephone poles, furniture, books—anything made of wood or wood pulp. Wood and water seem to be all they need to live on.

How they subsisted on this tough and meager regimen was long a puzzle. Wood is largely cellulose, and cellulose, though chemically related to such good foods as sugar and starch, is utterly indigestible to most of the higher animals.

Then it was discovered that the digestive tracts of the termites harbor strange and interesting zoological gardens of the lowly one-celled protozoa. Termite protozoa belong to a large variety of species, but they are unlike the protozoa that live inside other higher animals. It appeared highly likely that these primitive organisms, which like the bacteria can digest things that are beyond the power of most animals' stomachs, were in partnership with the termites. They received lodging and transportation from their insect hosts, together with first chance to extract nourishment from the wood, and in exchange they made the residue into something which the termites could finish digesting.

A few years ago a young scientist named L. R. Cleveland proved the point beyond cavil. He discovered that he could kill the protozoa without harming the termites, by putting the insects in a concentrated atmosphere of oxygen, by heating them, and in other ways. The "deprotozoanized" termites chewed up and swallowed woody food as usual, but without their tiny internal guests they could not digest it, and soon starved to death at a banquet of Tantalus!

Science News Letter, September 17, 1932

RADIO-ASTRONOMY

Radio Eclipse Tests Do Not Uphold Corpuscle Theory

NO CORPUSCULAR eclipse was detected in radio tests in Newfoundland and Canada, Dr. A. S. Eve of McGill University and chairman of the radio committee of the Canadian National Research Council, declared in a preliminary report of joint radio investigations during the recent total solar eclipse. British scientists had predicted the possibility of an effect on radio signals by an interruption of particles from the sun.

Special radio eclipse expeditions to Vankleekhill and Cornerbrook, Newfoundland, both directed by Dr. J. T. Henderson, and to Kingston, Ont., under Dr. D. C. Rose, measured distinct losses in ionization of both Kennelly-Heaviside layers, E and F, during the time that the optical eclipse was visible. This supports the idea that the radio-reflecting layers are caused by ultraviolet light from the sun.

Tests by the Northern Electric Company showed no intensity change in five hundred meter signals between Ottawa and Montreal and the Canadian Marconi

Company found no changes in 22 to 37 meter transatlantic waves.

The radio-reflecting layer of the earth's atmosphere which is about sixty miles above our heads is caused by radiation from the sun traveling with the speed of light. This tentative verdict comes as the result of extensive radio tests during the eclipse.

The Bureau of Standards results also uphold the idea that ultraviolet light and not solar particles are responsible for the formation of the ionized reflecting layer.

The critical frequency of the E or lower region of Kennelly-Heaviside layer decreased approximately a thousand kilocycles during the eclipse, lagging behind phases of the eclipse by approximately five minutes. After return to normal no later effects were observed.

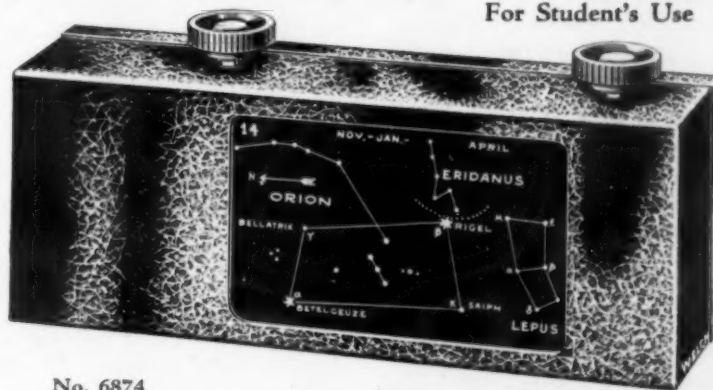
The radio scientists under Dr. J. H. Dellinger also studied the upper ionized layer, but their experiments are not yet complete.

Science News Letter, September 17, 1932

The ancient Greeks as far back as 800 B.C. ate three meals a day, on a breakfast, dinner, supper schedule very much like that on American farms today.

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• First Glances at New Books

Astronomy

ASTRONOMY FOR EVERYBODY—Simon Newcomb—*Garden City Publ. Co.*, 334 p., \$1. The old Newcomb book, published in 1902, was one of the most successful popular books on astronomy that has ever appeared. Prof. R. H. Baker of the University of Illinois has gone over it thoroughly, revising the original text and adding new sections to take care of many things undreamed of in the astronomy of a generation ago. And the publishers perform a public service in offering the book at a price that makes it a bargain even in depression times.

Science News Letter, September 17, 1932

Engineering-Public Health

WATER SUPPLY CONTROL—Charles R. Cox—*New York State Department of Health Board of Sanitation*, 118 p., 50c outside New York State. The difficulty of maintaining healthful water supplies, in which the public has built up confidence, is increasing because of the growing pollution of streams, the introduction states. This book is an attempt to maintain present standards by the instruction of operators, for it is held that a good operator is even more important than the newest equipment. The subject is covered concisely, but completely.

Science News Letter, September 17, 1932

General Science-Education

AMERICA IN THE MACHINE AGE—Louis Weinberg—*Heath*, 346 p., \$1. A presentation for classroom use of problems before America today. History of science, economic history, conservation of resources and events during and since the World War are material drawn on.

Science News Letter, September 17, 1932

Geology

PENNSYLVANIA CAVES—Ralph W. Stone—*Pa. Topographic and Geologic Survey, Harrisburg*, 143 p. A second edition, revised and enlarged, of a comprehensive account of Pennsylvania's many beautiful and interesting caverns.

Science News Letter, September 17, 1932

Ethnology-Archaeology

BUREAU OF AMERICAN ETHNOLOGY—47th Annual Report, 1929-1930—*Government Printing Office*, 1108 p., \$2.25. Additional to a short administrative report by M. W. Stirling, chief of the bureau, this Smithsonian Institution publication contains a paper on the Acoma Indians by Leslie A. White, a

detailed study of Isleta, New Mexico, culture by Elsie Clews Parsons, and four comprehensive papers on the Zuni by Ruth L. Bunzel.

Science News Letter, September 17, 1932

Geophysics

PHYSICS OF THE EARTH—V: OCEANOGRAPHY—Subsidiary Committee on Oceanography—*National Research Council*, 581 p., \$5. The science of the sea has heretofore been considered largely from the standpoint of biology or navigation. In this fundamental summary of oceanography sixteen authorities consider various aspects of the geophysics of the ocean. As the fifth volume of the important series of National Research Council Bulletins on the Physics of the Earth, it will serve the useful purpose of presenting a systematic summary of its subject to scientists who are not necessarily specialists in this particular field. It is issued as Bulletin No. 85 of the National Research Council.

Science News Letter, September 17, 1932

Sociology

SOCIAL CHANGES IN 1931—Edited by William F. Ogburn—*Univ. of Chicago Press*, 142 p., \$1. A useful survey of civilization's progress during the year. This is one of a series of surveys which will have historical as well as current interest.

Science News Letter, September 17, 1932

Physics

ELEMENTS OF THE THEORY OF RESONANCE—E. W. Brown—*Cambridge Univ. Press*, 60 p., \$1.25. Prof. Brown, the Yale mathematician, describes and analyzes in this pamphlet the phenomena which are peculiar to resonance. Although this subject is of fundamental importance in many mechanical problems, it has received but little attention in the textbooks.

Science News Letter, September 17, 1932

Bacteriology

A TEXTBOOK OF BACTERIOLOGY—K. L. Burdon—*Macmillan*, 542 p., \$2.75. A good, connectedly-written textbook suitable for beginning college classes, pre-medical students, nurses, etc.

Science News Letter, September 17, 1932

Engineering-Sociology.

PLANNING FOR RESIDENTIAL DISTRICTS—Edited by John M. Gries and James Ford—*The President's Conference on Home Building and Home Ownership*, 227 p., \$1.15. President Hoover in the foreword of this first volume published by the Conference states: "The next great lift in elevating the living conditions of the American family must come from a concerted and nationwide movement to provide new and better homes." City planning and zoning, subdivision layout, utilities for houses and landscape planning and planting are considered in the reports of this volume. The President's Conference of December, 1931, will have its committee reports issued in a total of eleven volumes.

Science News Letter, September 17, 1932

Engineering

SCHOOL VENTILATION PRINCIPLES AND PRACTICES—New York Commission on Ventilation—*Teachers College, Columbia University*, 73 p., \$1. The window-gravity method of ventilation for school classrooms (in the absence of specific unfavorable local conditions) is as efficient as the fan system and is generally more satisfactory, concludes the final technical report of work supported by the Milbank Memorial Fund. Law and code makers, educational authorities and architects will find this report worthy of serious consideration.

Science News Letter, September 17, 1932

Ornithology

ORNITHOLOGY OF THE ONEIDA LAKE REGION: WITH REFERENCE TO THE LATE SPRING AND SUMMER SEASONS—Dayton Stoner—*Roosevelt Wild Life Forest Experiment Station, Syracuse*, 497 p., 2 pl., 1 map; \$1.25. Field students of birds and their ways will welcome this new addition to the *Roosevelt Wild Life Annals* series.

Science News Letter, September 17, 1932

Engineering

REFRIGERATING DATA BOOK AND CATALOG—*American Society of Refrigerating Engineers*. 562 p., \$3.50. A branch of engineering which has rapidly sprung into prominence in the past few years orients itself. This is the profession's first handbook. The Society plans to publish new editions every other year.

Science News Letter, September 17, 1932

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